

Investigation of the Propagation of Millimeter
and Submillimeter Waves
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Using the VCT14E Klystron and the new cross-guide multiplier to power the Fabry-Perot cavity, loss measurements on H_2O and its mixtures with other atmospheric gases were extended downward to 150 Gc and upward to 300 Gc.

In addition to N_2 the effect of CO_2 as a broadener was investigated for the first time at these frequencies. Significantly higher losses were obtained in these measurements than are predicted by theory and the high ratio of the effects of CO_2 to those due to N_2 promises very interesting results.

Measurements in pure CO_2 were made to calibrate the Fabry-Perot cavity and at 300 Gc definite losses were observed in this gas. Such losses can arrive either from impurities or also from the collision induced rotational spectrum due to the quadrupole moment on CO_2 .

To calibrate the Fabry-Perot interferometer, a sample of ethane was purchased from Mathieson and tried. This sample turned out to be quite lossy and an attempt will be made to analyse the impurities.

In searching for the H_2O transitions at 440 and 475 Gc power was obtained above 500 Gc and the OCS line at 510 Gc was observed. It is possible that the 440 and 475 transitions in H_2O are too weak to be observed in the absorption cell and some thought will be given to using the Fabry-Perot for this.

The success of the new multiplier and CV714E klystron suggest the use of this combination on the absorption cell in a search for higher harmonics.

V. E. Derr

V. E. Derr
Principal Researcher

A. H. Ryan

A. H. Ryan, Manager
Physical Sciences Laboratory

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